

AN ANNOTATED LIST OF CHARACIN FISHES IN THE
UNITED STATES NATIONAL MUSEUM AND THE MU-
SEUM OF INDIANA UNIVERSITY, WITH DESCRIPTIONS
OF NEW SPECIES.

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In the following pages are enumerated the Characin fishes belonging to the United States National Museum. They are principally derived from the following sources:

1. A series of Dr. Chr. Lütken's species from the collections made by J. Reinhardt, at Lagoa Santa and the Rio das Velhas, Brazil (1850-1856).

2. A collection of the United States and Mexican Boundary Survey (1851-1854).

3. A collection made by Lieut. Lardner Gibbon, U. S. Navy, in Bolivia (1852).

4. A collection made by Capt. T. J. Page, U. S. Navy, in Paraguay (1853).

5. The collections made for J. C. Brevoort and E. G. Blackford, chiefly at Para, Brazil.

6. A collection by Lieut. N. Michler and A. Schott from the Truando near the Rio Atrato, Colombia (1857-58).

7. A collection from the Marañon and Napo rivers, Brazil, made by James Orton (1867).

8. The collections from Panama and Nicaragua made by Dr. J. F. Bransford (1876).

9. A collection from the Nile River, Egypt, made by the Senff Expedition (1899).

Unless otherwise indicated the numbers are those of the catalogues of the United States National Museum.

The National Museum also contains the collection from the Amazon River, made by Prof. J. B. Steere in 1901.

These have been reported on elsewhere.^a The collection of Page

^aSee Eigenmann and Bean, Proc. U. S. Nat. Mus., XXXI, pp. 659-668.

from Paraguay is the most extensive, and at the time it was made was by far the most important collection from that region. But the numerous new forms it contained when it was made have since been described by Perugia, Boulenger, and Eigenmann from other collections.

A small but very interesting series is that which was made by Michler and Schott in the Atrato Basin. Inasmuch as the Atrato River forms part of the probable route of migration of the eastern fresh-water fishes to the Pacific slope everything from that part of Colombia is of great interest.

In preparing these notes use has also been made of the collections of Indiana University, which include the following:

1. A collection by H. von Ihering from Rio Grande do Sul, Brazil.
2. A collection by H. von Ihering from São Paulo, Brazil.
3. Duplicates of the collections of C. F. Hartt from the Amazon Basin, Brazil.
4. Collections of the Indiana University Expedition to Guatemala.
5. Various collections from the Paraguay Basin made by J. D. Anisits.
6. Duplicate specimens from the Mexican collections of S. E. Meek.
7. Duplicate specimens from the Argentine collections of J. W. Titcomb (1903-4).
8. A collection from Trinidad, made by Mr. Lechmere Guppy, jr. We have also examined the Princeton University collections made by Prof. W. B. Scott in Buenos Aires, Argentina, and the collection made by Mr. O. Riddle in Venezuela.

The following new names appear in this paper:

- Gilbertolus Eigenmann* (new name).
Eremanuolus Eigenmann (new name).
Curimatus boulengeri Eigenmann (new name).
Curimatus biveripes Eigenmann and Ogle.
Curimatus leuciscus bolivix Eigenmann and Ogle.
Prochilodus beani Eigenmann.
Parodon paraguayensis Eigenmann.
Parodon piracicabae Eigenmann.
Leporinus parze Eigenmann.
Leporinus steindachneri Eigenmann (new name).
Cheirodon ribeiroi Eigenmann.
Cheirodon micropterus Eigenmann.
Odontostilbe microcephalus Eigenmann.
Aphyochara rathbuni Eigenmann.
Aphyochara stramineus Eigenmann.
Holopristes riddlei Meek.
Hemigrammus micropterus Meek.
Hemigrammus tridens Eigenmann.
Hemigrammus boulengeri Eigenmann.
Hemigrammus anisitsi Eigenmann.
Hemigrammus santae Eigenmann.

Hemigrammus inconstans Eigenmann and Ogle.
Astyanax rutilus nicaraguensis Eigenmann and Ogle.
Astyanax emperador Eigenmann and Ogle.
Astyanax orthodus Eigenmann.
Astyanax atratocensis Eigenmann.
Astyanax megalops Eigenmann.
Phenacogrammus Eigenmann.
Charax atratocensis Eigenmann.

I am informed that the names *Gilbertella* and *Evermannella* proposed for Characin genera are preoccupied. For the former I propose the name *Gilbertolus* Eigenmann; for the latter, *Evermannolus* Eigenmann.

Psectrogaster auratus Gill.

No. 5878. Type Bolivia, Gibbon collection.

Psectrogaster curviventris Eigenmann and Kennedy.

No. 2106. Two specimens, Paraguay, Page collection.

Curimatus albula Quoy and Gaimard.

No. 44956. Two specimens, Lagoa Santa, Brazil, Reinhardt collection.

Curimatus boulengeri Eigenmann, new specific name.

For *Curimatus güntheri* BOULENGER, not of Eigenmann and Eigenmann.

Curimatus bimaculatus Steindachner.

No. 1639 (part). Two specimens, Paraguay, Page collection.

No. 2107. Two specimens, Paraguay, Page collection.

Curimatus platanus Günther.

No. 1639 (part). One specimen, Paraguay, Page collection.

Head 3.4; depth 3.25; D. 12, counting everything; A. 10½; scales between 53 and 57. A small black caudal spot, no dorsal spot.

? **Curimatus gilberti** Quoy and Gaimard.

No. 39148. A specimen 42 mm. to base of caudal. From Montevideo, Uruguay.

Head nearly 4; depth 3½; D. 12; A. 9; scales 6-36-5; tail with a dusky lateral streak ending in a large black spot in front of the caudal. Entire back with obscure dark spots.

Curimatus brevipes Eigenmann and Ogle, new species.

Type.—Cat. No. 35333, U.S.N.M. A specimen 131 mm. to base of caudal, Peru?. Orton collection.

Allied to *C. leucostictus*. Head 3.5; depth 3½; D. 12, including the first rudiment; A. 10; scales 8-47-6½ (above ventrals). Heavy, elongate, rhomboidal. Preventral region broadly rounded, without keels and without a median series of scales; postventral region and postdorsal region rounded; predorsal region obscurely ridged; mouth subterminal.

Anterior profile very slightly concave, strongly convex behind the occiput; eye equal to snout, 3¼ in head, 2 in interorbital; scales crenate; caudal apparently entirely naked. Highest dorsal ray probably

little longer than head, less opercle; anal emarginate, its highest ray probably not reaching caudal; ventrals not reaching vent, pectorals

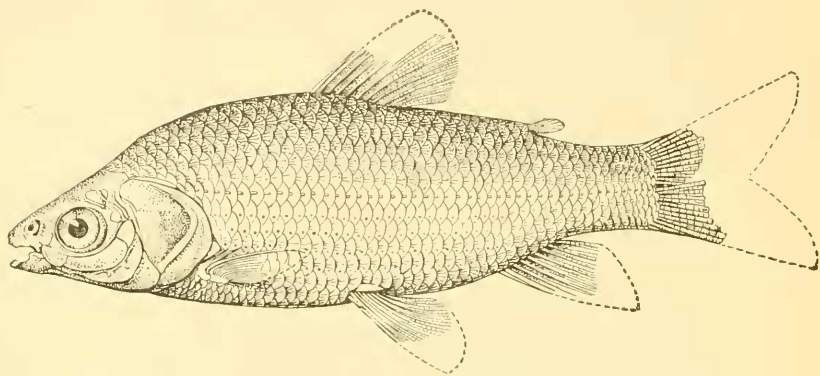


FIG. 1.—*CURIMATUS BREVIPES*.

not to ventrals. Brassy, darker above. No definite spots, distal part of dorsal and a line between every two of the last seven rays, dotted; distal part of anal dotted.

Curimatus leuciscus boliviae Eigenmann and Ogle, new subspecies.

Type.—Cat. No. 44832, U.S.N.M. One specimen 95 mm. to base of caudal, Bolivia, Gibbon collection.

This variety differs from the typical species in having but 57 scales in the lateral line instead of 60–64, in the absence of a dusky spot at the tip of the occipital process, and by the presence of a dark spot on the seventh dorsal membrane, some distance from its base.

Curimatus knerii Steindachner.

No. 34697. Probably from Para, Brazil, presented by J. C. Brevoort.

Anodus latior Spix.

No. 44836. One specimen, Bolivia, Gibbon collection.

Elopomorphus elongatus (Spix).

No. 5926. One specimen (type of *E. jordani*), Bolivia, Gibbon collection.

Hemiodus othonops Eigenmann and Kennedy.

No. 2103. One specimen, Paraguay, Page collection.

Rhytidus microlepis Kner.

No. 5876. One specimen, Bolivia, Gibbon collection.

Distichodus fasciolatus Boulenger.

No. 44815. One specimen, Congo, Africa, collected by J. H. Camp.

?*Distichodus brevipinnis* Günther.

No. 52096. One specimen, Nile-Atbara Junction, Senff-Expedition collection, collected by Bashford Dean.

Head $4\frac{2}{3}$; depth $2\frac{2}{3}$; eye 5; D. $21\frac{1}{2}$; A. 15; scales 16–90–14. Lower jaw with about 20 teeth. Distance between dorsals more than twice

the base of adipose; base of dorsal equals length of head. About 12 indistinct cross bands, their lower ends more or less disconnected to form a series of spots below the lateral line, the first spot most prominent and in part on the lateral line.

Prochilodus insignis Schomburgk.

No. 3070. One specimen, Bolivia, Gibbon collection.

Prochilodus vimboides Heckel.

No. 26696. One specimen, Brazil, presented by the Museum of Comparative Zoology.

Prochilodus beani Eigenmann, new species.

Type.—Cat. No. 1662, U.S.N.M. A specimen about 195 mm. long, 153 to end of lateral line. Truando, Colombia, collected by A. Schott.

Cotype.—Cat. No. 1662*a*, U.S.N.M. A specimen about 195 mm. long, 160 mm. to end of lateral line.

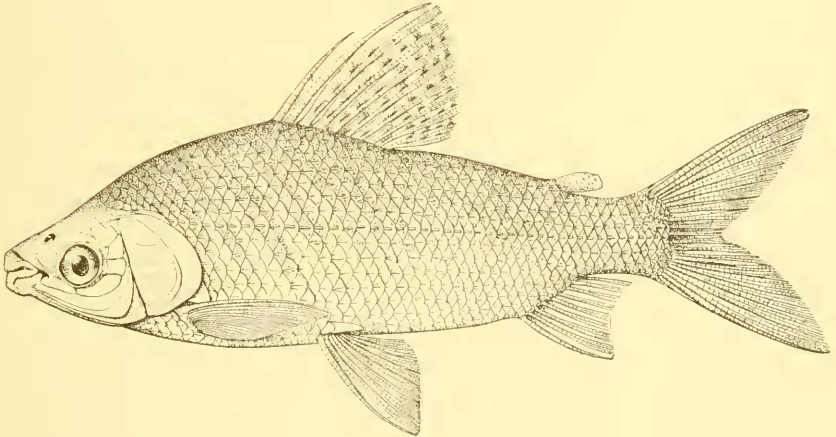


FIG. 2.—PROCHILODUS BEANI.

Allied to *brevis*, *rubrotentatus*, *cephalotes*, *magdalense*, *argenteus*, *platensis*, and *scrofa*.

Head 3.8 in length to end of lateral line (3.6 in cotype); depth $2\frac{5}{8}$ (3); D. 11; A. 11; scales 8-44-7 (8-43-7). Snout slightly projecting; eye about 4 in head, interorbital not quite 2; snout $2\frac{2}{3}$; opercle faintly striate; suborbitals covering about half the cheek; fontanel linear, extending to nares; dorsal inserted over tenth scale of the lateral line, the ventrals below the tenth or eleventh; height of dorsal equals length of head less upper lip, equal to the distance between the dorsals; pectorals reaching ventrals; highest ray of anal reaching tip of last; scales rough.

Dorsal with numerous paired spots before and behind the rays, these more conspicuous backward, sometimes joined into lines, absent from first two or three rays; caudal uniform except for a faint spot at the base of its middle rays; anal and upper surface of pectorals dusky;

faint stripes along the rows of scales; faint dark cross shades. These specimens differ from the specimen of *scrofa* recorded by Eigenmann and Norris from Piracicaba in the number of scales (9-48-8), the height of the dorsal (equals head less snout in front of nares), the extent of the pectorals (to third scale in front of ventrals). There are other minor differences, but the two forms are evidently quite similar. Origin of dorsal over the eleventh scale of the lateral line, origin of ventrals below the fifteenth.

Named for Mr. Barton A. Bean, Assistant Curator, Division of Fishes, United States National Museum.

Prochilodus scrofa Steindachner.

No. 21445. One specimen, Paraguay, Page collection.

No. 1632. One specimen, Paraguay, Page collection.

Parodon paraguayensis Eigenmann, new species.

Parodon affinis EIGENMANN and KENNEDY (not Steindachner), Proc. Acad. Nat. Sci. Phila., 1903, p. 512.

Type.—No. 9953, I. U. Museum, a specimen 18 mm. long to base of caudal. Asuncion, Rio Paraguay. Anisits. 70

Cotypes.—No. 9953a, Museum of Indiana University. Numerous specimens, Asuncion. Also other specimens, Nos. 9952, 9975, and 10237, Indiana University Mus., 35 to 105 mm. to base of caudal, the largest 105 mm., Asuncion; and Cat. No. 1641, U.S.N.M., one specimen 100 mm. to end of lateral line, Paraguay, Captain Page; and Cat. No. 2108, U.S.N.M., 112 and 105 mm. to end of lateral line.

Teeth 2-4, 4-2; head 3.5 to 4; depth 4.33-5.5; D. 11 or 12; A. 8; P. 12; scales 4-42 to 44-4; eye $3\frac{1}{2}$ -4 in head; snout 3; interorbital about equal to snout; width of mandible $5-5\frac{1}{2}$ in the length of the head.

Origin of dorsal equidistant from tip of snout and tip of adipose or a little posterior; height of dorsal equal to head in front of upper angle of gill opening; margin of dorsal obliquely truncate, the highest ray extending beyond tip of last; adipose over anal; ventrals under seventh or eighth dorsal ray, their tips 2 or 3 scales removed from anus; tips of pectorals 4 scales removed from ventrals. Scales highly iridescent; a dark band from tip of snout along lateral line to tip of middle caudal rays, a silvery band below it; back with faint dark cross shades.

Parodon piracicabæ Eigenmann, new species.

Parodon affinis EIGENMANN and NORRIS (not Steindachner), Revista Museum, Paulista, IV, 1900, p. 356.

Type.—No. 9292, Indiana University Museum, 108 mm. to end of lateral line; Piracicaba, von Ihering.

Cotypes.—No. 9292a, Indiana University Museum, 105 and 100 mm. to end of lateral line. Piracicaba. Teeth 2-4, 4-2; head 5; depth $4\frac{1}{2}$; D. 12; A. 8; P. 14; scales 4-41 or 42-3; eye 3.6-4 in head; snout about 3; interorbital about equal to snout; mandibles narrow, the

width of their margin 6 in the length of the head; dorsal and ventral outlines about equally arched.

Origin of dorsal about equidistant from tip of snout and middle of adipose; highest dorsal ray about equal to length of head in front of upper angle of gill opening, its margin obliquely truncate, the longest ray scarcely projecting beyond tip of last ray; origin of ventrals below seventh to ninth dorsal ray, their tips one or two scales from anus; tips of pectorals about 6 scales from ventrals.

A dark stripe from tip of snout along lateral line to end of middle caudal rays, another between first and second scale below dorsal from occiput to adipose dorsal; a silvery band below the lateral band; a dusky spot or two in front of the dorsal; back with faint cross shades.

Anostomus borellii Boulenger.

Anostomus borellii BOULENGER, Boll. Mus. Univ. Torino., XV, 1900 (Carandasiñho, near Corumba).

Anostomus fasciatus EIGENMANN and KENNEDY, Proc. Acad. Nat. Sci. Phila., 1903, p. 512 (Rio Paraguay and Estancia la Armonia). Not of Spix.

Cat. No. 1632, U.S.N.M., 6 specimens, about 125 mm. to end of lateral line, Paraguay, Page collection.

These specimens differ from the type of *A. borellii* in having 9 or 10 anal rays instead of 8.

Anostomus isognathus Kner.

No. 2105. One specimen, Paraguay.

Schizodon fasciatus Spix.

No. 34687. One specimen, Para, Brazil, presented by J. C. Brevoort.

No. 44834. One specimen, Bolivia, Gibbon collection.

Leporinus trifasciatus Steindachner.

No. 4942. One specimen, Uruguay River at Salto, September 17, 1860, Page collection.

No. 1629. One specimen, Paraguay, Page collection.

Leporinus frederici Bloch.

No. 1628. One specimen, Paraguay, Page collection.

Leporinus reinhardti Lütken.

No. 44958, probably one of the types, Lagoa Santa, Brazil.

Leporinus megalepis Günther.

No. 44951. One specimen (one of the types of *L. maregrarii*), Rio das Velhas, Brazil.

?**Leporinus myuscorum** Steindachner.

No. 1656. Three specimens, Truando, Colombia, Michler and Schott collection.

D. 12, 12, 13; A. 10; lat. line 39, 40, 41.

Leporinus striatus Kner.

No. 34660. One specimen, presented by J. C. Brevoort (?).

No. 1657. Two specimens, Truando, Colombia, collected by A. Schott.

Leporinus tæniatus Lütken.

No. 44952. One specimen (probably one of the types), Rio das Velhas, Brazil.

Lat. line 37; D. 13; A. 9; head, $4\frac{1}{2}$; depth about $3\frac{3}{4}$; a dark lateral band. Dorsal and anal rounded, the latter reaching caudal. A second specimen, labeled *tæniatus* by Lütken, from Rio das Velhas, Brazil, seems to be distinct.

Lat. line 36, D. 13; A. 11; head 4, depth about 4. No markings apparent; anal and dorsal rounded, the former reaching caudal.

Leporinus paræ Eigenmann, new species.

Type.—Cat. No. 34613, U.S.N.M. Specimen 76 mm. to the end of the lateral line. Para, Brazil. Presented by J. C. Brevoort.

Cotype.—Cat. No. 34613a (part). Specimen 63 mm. to end of the lateral line.

Cotypes.—Cat. No. 34575, two specimens, 126 and 74 mm. to end of the lateral lines, respectively. Presented by J. C. Brevoort.

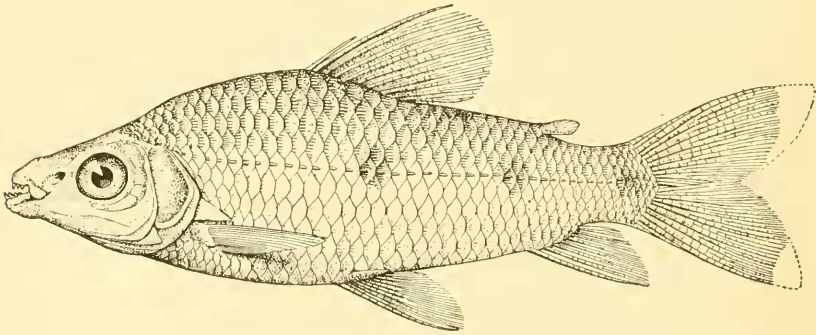


FIG. 3.—LEPORINUS PARÆ.

Allied to *nattereri*, *agassizii*, *megalepis*, and *frederici*.

Head 4; depth 3; D. 12; A. 10 or 11; scales 5-37 to 39-5. Compressed; profile slightly concave over eye, convex from nape to dorsal; basis of dorsal more oblique than the slope posterior to the dorsal; eye $3\frac{2}{3}$ -4; snout 3, interorbital 2-2.25; maxillary groove extending to below the point midway between the nostrils; nostrils close together or more remote, teeth 4-4, rather small but sharp; dorsal and anal rounded, highest anal rays reaching to the caudal, much beyond tips of last ray; highest dorsal ray little less than length of head; caudal short, the upper lobe about equal to the highest dorsal ray; pectorals not reaching ventrals by the length of about 3 scales.

A small dark spot just behind the gill openings and below the lateral line; a dark spot on the lateral line below the dorsal, another on the lateral line in front of the anal, and a third just in front of the caudal; traces of a silvery streak along the lateral line as in *L. nattereri*; lighter lines following the rows of scales, especially below the lateral line; back with faint traces of darker marblings.

Leporinus steindachneri Eigenmann, new specific name.

Leporinus affinis STEINDACHNER, Süßwf. Südöstl. Bras., II, 1875; p. 18, pl. III (Rio Arassuahy, tributary of the Rio Jequitinhonha). Not of Günther.

Characidium fasciatum Reinhardt.

No. 44950, Rio das Velhas, Brazil, Reinhardt collection.

Cheirodon interruptus Jenyns.

A comparison of the specimens recorded by Eigenmann and Kennedy^a as *C. interruptus* and *C. insignis*, with a specimen of *calliurus* from Carandasiño, received from the British Museum, shows them to belong to the same species. It is possible that these are distinct from the *C. interruptus* of Jenyns, but we are unable to point out the differences.

Cheirodon monodon Cope.

No. 11090, Museum of Indiana University, one of the specimens recorded by Eigenmann^b as *Tetragonopterus fasciatus interruptus*, from Rio Grande do Sul, Brazil, seems to belong to this species.

Cheirodon ribeiroi Eigenmann, new species.

Type.—No. 10229, Museum of Indiana University. Specimen 35 mm. to base of caudal. Puerto Max, Paraguay Basin. Collected by J. D. Anisits.

Head 3.4; depth 3; D. 11; A. 26; scales 5-33-4; eye $2\frac{1}{2}$, much larger than in *C. interruptus*, equal to postorbital portion of head, greater than interorbital; fontanels reaching a little beyond middle of eye; teeth black; premaxillary with 4 very broad-tipped teeth, the middle point not much greater than the lateral ones; each ramus of the mandible with 4 teeth (apparently no smaller ones on the sides); maxillary comparatively long and slender, reaching beyond anterior margin of the eye; pectorals reaching ventrals, ventrals not to anal; adipose fin well developed; dorsal behind the ventrals. A black line concurrent with the back from eye to caudal peduncle; a large black humeral spot above the lateral line, just posterior to base of pectorals; caudal spot occupying the entire width of the caudal peduncle. Another much smaller specimen from the Arroyo Pypucu probably belongs to this species. It has one tooth multicuspid in each maxillary.

Named in honor of the naturalist of the Brazilian National Museum, Dr. Alipio de Miranda Ribeiro.

Cheirodon micropterus Eigenmann, new species.

Tetragonopterus bellottii ULREY, in part, Ann. N. Y. Acad. Sci., VIII, 1895, p. 286. Not of Steindachner.

Type.—No. 11092, Museum of Indiana University. Specimen 27 mm. to base of caudal. Santarem, Brazil.

^aProc. Acad. Nat. Sci. Phila., 1903.

^bAnn. N. Y. Acad. Sci., VII, p. 634.

Scales 6-31-4; A. 20; head about 4; depth 3; eye 2.6, twice as long as snout, but very little greater than interorbital; maxillary short, not extending beyond front of eye, with two teeth; mouth small, teeth all broad-tipped and multicuspid, about 5 in each premaxillary, 4 or 5 in each ramus of the lower jaw. Dorsal profile arched; origin of dorsal midway between tip of snout and base of caudal. Pectoral short, just reaching ventral; ventrals not to anal. No humeral spot; a well defined caudal spot not extending to the ends of the middle rays, otherwise plain.

Odontostilbe microcephalus Eigenmann, new species.

Type.—No. 11086, Museum of Indiana University. Specimen 46 mm. in total length, Rio Pilcomayo, Bolivia.

Cotype.—No. 11086a, Museum of Indiana University. Specimen 45 mm. in total length, from the same locality.

Both these specimens were received in exchange from the British Museum, and were labelled *Cheirodon pequiru*. They lack the complete dentition and the peculiar marking of the dorsal of *pequiru*. They seem to represent a new species of *Odontostilbe* in its narrowest sense; that is, the teeth are in a single series, the maxillary has but few teeth, and the lateral line is complete. This species is very nearly allied to if not identical with *fugitiva*.

Head 4.33; depth 4; D. 10; A. 18-20; scales 6-36-5; eye 3 in head, equal to interorbital.

Elongate, slender, the dorsal and ventral profiles very little arched; head very small, slightly convex; frontal fontanel reaching about to middle of eye; mouth small, the maxillary slender, reaching to below margin of eye; teeth broad, many pointed, the middle point prominent, 5 in each premaxillary, 1 on the maxillary and 6 graduated ones on the mandibles; cheeks mailed, a narrow naked area between suborbitals and the vertical limb of the preopercle; origin of dorsal in the middle of the length, behind the base of the ventrals; pectorals not reaching ventrals, ventrals not to anal; caudal much longer than head; lateral line decurved, running below middle of body. A silvery lateral band, a dusky spot at base of caudal.

Aphyocharax rathbuni Eigenmann, new species.

Aphyocharax anisitsi (part), EIGENMANN and KENNEDY, Proc. Acad. Nat. Sci. Phila., 1903, p. 517.

Type.—No. 10025 museum of Indiana University; specimen 26 mm. to base of caudal, Arroyo Cbagalalina, Paraguay Basin.

Head 4; depth 3; A. 20; D. 9; scales 5-35-3; eye 3 in head, about twice as long as snout; mouth minute, maxillary not reaching anterior margin of orbit, its free surface very much convex; no teeth on maxillary, about 5 on each premaxillary and about 6 on each side of the lower jaw, the middle one much the largest, the next two graduated, the lateral ones minute; pectorals not quite reaching ventrals, ventrals

not quite to anal; dorsal over posterior third of ventrals. Caudal margin dusky; anal margin to the anterior lobe black, two or three spots continuing the black to the beginning of the second third of the first full-length rays; ventrals dusky; dorsal with its basal half and last rays black; no humeral spot; back peppered, a few large cells on the opercle.

Named in honor of Dr. Richard Rathbun, of the U. S. National Museum.

Aphyocharax stramineus Eigenmann, new species.

Aphyocharax alburnus EIGENMANN and KENNEDY, Proc. Acad. Nat. Sci. Phila., 1903, p. 517. Not of Günther.

Type.—No. 10030. Museum of Indiana University. Specimen 25 mm. to base of caudal, Arroyo Trementina.

Head 4; depth 3; D. 10; A. 19; scales 5-35-3 (to ventrals); eye $2\frac{3}{5}$ in head; snout little more than half the eye in length; dorsal and ventral outlines equally arched; mouth very minute; premaxillary with 7 teeth; maxillary short, its anterior face below the teeth semicircular, about 2 teeth on its upper part; about 9 teeth on each side of the lower jaw; maxillary reaching to below posterior nostrils; pectoral not reaching ventrals by 2 scales; ventrals not to anal; origin of dorsal over last third of ventrals; adipose well developed; no distinct markings on fins. A comparison of this specimen with specimens of *A. alburnus* makes it certain that it is distinct.

Holopristes riddlei Meek, new species.

The two species of *Holopristes* may be distinguished as follows:

- a Humeral spot surrounded by a bright ring; caudal spot dark brown, fins otherwise plain; a sharp gray line between humeral and caudal spots; caudal partly scaled, the peduncle very slender; dorsal posterior to origin of ventral; 6-8 scales of the lateral line perforate; A. 26-28; head $3\frac{1}{3}$ - $3\frac{2}{3}$; depth $2\frac{1}{2}$ - $2\frac{3}{4}$; scales 5-31- $3\frac{1}{2}$ *ocellifer*.
- aa A humeral spot, no caudal spot; dorsal, anal, and ventrals each with a conspicuous, jet-black spot; dorsal spot not extending upon the last ray, and leaving base and tips of rays hyaline; anal spot covering the third, fourth, and fifth of the rays forming the anterior lobe; ventral spot leaving the outer and inner rays and bases and tips of all the rays hyaline; head about 4; depth 2.6; scales, 33; A. 21-23; eye 2.64 in head; snout 4.12; maxillary 2.2; pectorals not reaching ventrals, ventrals to anal ^a *riddlei*.

This species is named for Dr. Oscar Riddle, who collected it.

Genus HEMIGRAMMUS Gill.

This genus differs from *Astyannus* only in the incompleteness of its lateral line. One of its species, *inconstans*, here described, varies in this respect, some of the specimens having the lateral line complete.

^aThis description is based on a specimen collected by Dr. Oscar Riddle at Los Castillas, Venezuela, and now in the collections of the Field Columbian Museum, Chicago.

others not. Whether some of the specimens of this species examined are simply abnormal variations, whether the species is normally variable in this respect or whether we are dealing here with a mutation in the Devriesian sense still remains to be seen. If the species normally varies in this respect it forms a bridge between *Astyanas* and *Hemigrammus* and the latter must be merged with the former. (A similar condition is found in *Manikhausia*, one of whose species, *agassizii*, occasionally presents specimens with an incomplete lateral line.) For the present the two genera may be kept distinct. The species of *Hemigrammus* are all small, none of them reaching a length of 4 inches. Most of them are much smaller. They are distributed from Oaxaca, Mexico, to the Rio de la Plata and from Para to the Peruvian and Ecuadorian Amazons. They are not recorded from the Pacific slope. As the species are all small we may expect many additions to the genus. *H. lütkeni*, *H. unilineatus*, *H. gracilis* appear the most widely distributed species, the first being recorded from Rio Grande do Sul and the Paraguay Basin, the second from Trinidad to Bahia and the last from the Rio San Francisco to the Amazons. Of the 19 species I have been able to examine all but *elegans* and *robustus*.

KEY TO THE SPECIES OF THE GENUS HEMIGRAMMUS.

a Scales 30-36.

b Dorsal conspicuously marked with a well-defined black spot; anal with definite markings.

c A deep humeral spot; dorsal almost entirely black, middle caudal rays, last five anal rays and distal two-fifths of the remaining anal rays black; D. 10 or 11; A. 27 or 28; depth $2\frac{3}{5}$ -3; head $3\frac{1}{5}$ - $3\frac{3}{5}$; eye $2\frac{3}{5}$ - $2\frac{1}{2}$; scales 6 or 7-33 or 34-5 or 6, five scales with pores; maxillary with two teeth, each with 3 points of nearly equal length. (Boulenger)..... *callistus* (Boulenger) 1.

cc No humeral or caudal spots; a large black spot on the upper part of the dorsal, sometimes obsolete; a narrow stripe of black from anus along margin to the tip of the first anal rays; head 3.75; depth 2.75; eye 3 in the head; scales 6-34-5; five teeth in maxillary..... *unilineatus* (Gill), 2.

bb Dorsal without well-defined markings.

d Anal with black markings.

e A milk-white stripe on the fore edge of the anal, and a rather broad violet stripe immediately behind it; a faint lateral band; A. 24; head $3\frac{1}{4}$ - $3\frac{3}{5}$; depth $2\frac{3}{5}$ - $2\frac{2}{5}$; scales 5 or $5\frac{1}{2}$ -30 or 31-4.

elegans, (Steindachner), 3.

dd Anal without definite dark markings.

f No humeral spot, caudal spot usually developed. (See *ubreyi*.)

g Maxillary without teeth; anal rays 17-19; height of anal nearly equal to the length of its base; 4-7 perforated scales in the lateral line; pectoral nearly to ventral; caudal deeply lobed; a large, diffuse, dark caudal spot extends to the end of some of the rays and fades out anteriorly; an inconspicuous silvery lateral band; depth 4; scales $3\frac{1}{2}$ -30 to 32- $2\frac{1}{2}$ *nanus* (Reinhardt), 4.

gg Maxillary with 2-4 conical or 3-pointed teeth.

h No caudal spot, maxillary with two minute conical or slightly notched teeth; dorsal and anal falcate, caudal widely forked;

anal 23-25; a small black humeral spot, a blackish line along the middle of the side and a black line along the base of the anal; dorsal blackish at the end; depth $2\frac{1}{2}$ - $2\frac{3}{4}$; head $3\frac{1}{2}$ - $3\frac{1}{2}$; eye 2 in the head; D. 10; scales 32-33, pores 8 or 9; no maxillary teeth *ulreyi* (Boulenger), 5.

hh Sometimes a caudal spot not extending to the end of the rays, fading out forward; maxillary with two minute conical teeth; a more or less conspicuous silvery lateral band; caudal deeply lobed; dorsal behind the ventrals, the pectorals extending to the ventrals, ventrals to anal; A. 21-24; head $4\frac{1}{4}$; depth 4; scales 5-32 or 33-4, 6-12 scales with pores *gracilis* (Reinhardt), 6.

hhh Maxillary with four conical or notched teeth; no lateral band; a small dark spot at base of each caudal lobe, fins all plain; head 3.85; depth 2.66; D. 9; A. 19.... *riddlei* Meek, new species, 7.^a

ggg Maxillary teeth with 4 or more points.

i Maxillary with one 4-pointed tooth; a single median caudal spot continued to end of middle caudal rays; dorsal over ventrals, pectorals not nearly reaching ventrals, ventrals not to anal; a black lateral line; dorsal scales margined with black; head 4; depth 3.2; scales 32, pores developed on 10 scales; A. 24.

micropterus Meek, new species, 8.^b

ii Maxillary with two 5-pointed teeth; a broad black band across base of caudal, extending forward to a blunt point, and backward as three prongs, a short one along the edge of each lobe and a longer one along the middle rays but not reaching the end of the rays; a dark lateral band; no humeral spot; depth 3, head about $3\frac{2}{3}$; eye $2\frac{1}{2}$... *tridens* Eigenmann, new species, 9.

fff Caudal and humeral spots both developed.

j Maxillary teeth conical or 3-pointed.

k Maxillary with one notched and two conical teeth; humeral spot indistinct, small; a small, inconspicuous, silvery-gray lateral band, margined above by a sharp, blue-gray line; a well-defined caudal spot; eye very large, 2 in head; snout $3\frac{1}{2}$; A. 20-23; head $3\frac{2}{3}$; depth 3; scales 5-30 or 31-3, 7-16 scales perforate..... *schmardae* (Steindachner), 10.

kk Maxillary with one 3-pointed tooth.

l Anal 22; scales about 30; maxillary 2.75 in head; a narrow black lateral line lying deeper than the caudal spot and not continued with it; caudal spot well defined, not quite reaching to end of middle rays; lower half of caudal blackish; basal two-thirds of anal dusky; ventrals reaching past origin of anal; pectorals past base of ventrals.

boulengeri Eigenmann, new species, 11.

ll A. 25-26; scales 33-36; mouth large, maxillary 3 in head, caudal spot rather abruptly continued to the end of the middle caudal rays, *gradually* narrowed in front into a dark lateral line; lower caudal lobe hyaline; distal third of anal dusky; ventrals to anal, pectorals to origin

^a Based on specimens collected by Dr. O. Riddle at Los Castillas, on the Orinoco, and now in the collections of the Field Museum of Natural History.

^b Based on specimens collected by Dr. Oscar Riddle at Los Castillas, on the Orinoco, and now in the collections of the Indiana University, and of the Field Museum of Natural History.

of ventrals; scales 6-33 to 36-5 or 6; lateral line developed on 10-25 scales.

anisitsi Eigenmann, new species, 12.

kkk Maxillary with 5 small stout teeth; anal rays 27; humeral spot not surrounded by a bright border; a greenish lateral band, humeral and caudal spots indistinct; middle of caudal fin blackish; body brown, muzzle black; maxillary reaching to middle of the pupil; dorsal behind the ventrals; head $3\frac{1}{2}$; depth $2\frac{1}{4}$; eye 3 in the head; scales 7-35-6..... *robustus* Cope, 13.

jj Maxillary teeth multifold.

m Anal 20-22; maxillary 3 in head; eye 3.25 in head, equals interorbital; maxillary with two 3- to 5-pointed teeth; depth 3; head 3.6; scales 5-32-4; pectorals not reaching ventrals... *santa* Eigenmann, new species, 14.^a

mm Anal 24-26; mouth small.

n Maxillary with two broad, 7 or more pointed teeth; eye equals interorbital, 2.75 in head; depth 2.3-2.6 in the length; head 3.7-4.4; scales 30-33; a humeral spot; a distinct silvery lateral band ending in a caudal spot which may or may not be continued to the end of the rays..... *lütkeni* Boulenger, 15.

mmm Maxillary with one very broad-tipped tooth much shorter than eye; A. 24-26; depth 2.6-2.75; head 4; scales 6-32 or 33-5; an obscure humeral spot, an indistinct lateral band; a conspicuous caudal spot which is not continued on the middle caudal rays; fins dusky; lateral line complete or incomplete..... *inconstans*, new species, 16.

ffj No caudal spot; maxillary with two minute, conical teeth; the humeral spot intense dark brown surrounded by a bright ring, round or vertically oval; a sharply marked blue-gray line along sides to base of caudal; dorsal behind the ventral; pectorals reaching ventrals, ventrals to anal; eye 2- $2\frac{1}{2}$ in head; snout 4; A. 22-24; head $3\frac{1}{2}$ - $3\frac{3}{4}$; depth $3\frac{1}{3}$ - $3\frac{2}{3}$; scales 5-31 or 32-3, 5-7 scales with pores.

bellottii (Steindachner), 17.

ffff No caudal or true humeral spot, a very conspicuous dark lateral band expanded anteriorly and bordered above by a very evident silvery band; anal with the first six rays elongate; maxillary with 4 conical teeth, reaching nearly to the center of the pupil; D. 10; A. 20-23; head $3\frac{1}{2}$; depth 3; eye $2\frac{1}{2}$ in head; lat. line 32-34.

heterorhabdus (Ulrey), 18.

aa Scales 40-48.

o Anal rays 40-46; scales 10-40 to 45-8; head $4\frac{1}{3}$; depth $2\frac{1}{3}$; lateral line with interruptions to the last fourth of the anal; a narrow dusky lateral band; maxillary with one minute, 3-pointed tooth.

kennedyi Eigenmann, 19.

oo Anal rays 25 to 27; scales 45-48; head $3\frac{1}{2}$; depth $2\frac{1}{2}$; D. 11; much compressed; no lateral bands or spots; dorsal with a conspicuous spot on the basal half of the anterior rays; maxillary with 5 notched or conical teeth..... *compressus* Meek, 20.

^aBased on Lütken's *Tetragonopterus interruptus*.

Hemigrammus nanus Lütken.

No. 44958. Four specimens from Lagoa Santa, Brazil, presented by Dr. Chr. Lütken. These are probably some of the types. No maxillary teeth.

Hemigrammus gracilis Lütken.

No. 44959. Four specimens, probably from Lagoa Santa, Brazil, presented by Lütken. A microscopic preparation shows the maxillary to have two conical teeth, scarcely projecting beyond the margin of the jaw.

Hemigrammus micropterus Meek, new species.

Type.—No. 10802. Museum of Indiana University. Specimen thirteen-sixteenths inch long; Los Castillos, Venezuela; Oscar Riddle, collector.

Head 4; depth 3.2; A. 24; scales 4-32-4; maxillary reaching to front of pupil; eye $2\frac{3}{4}$ in head; interorbital about equal to eye; maxillary with a single, 4-pointed tooth. Pectorals reaching within one scale of the ventrals, ventrals not quite to anal; origin of dorsal over origin of ventrals. Scales of the back with rather broad dark margins, a black lateral line, most intense above anal, not quite reaching the caudal spot, which extends to the end of the middle rays.

Hemigrammus tridens Eigenmann, new species.

Type.—No. 11262, Museum of Indiana University. Specimen 20 mm. to base of caudal. Arroyo Pypucu, Paraguay Basin, collected by J. D. Anisits.

Cotype.—No. 11262*a*, Museum of Indiana University, specimen 18 mm. to base of caudal. Arroyo Pypucu, Paraguay Basin, collected by J. D. Anisits. Head 3.4; depth 3; A. 16-19; lateral line probably between 30 and 35; eye 2.4 in head, considerably longer than the width of the interorbital. Maxillary extending to below eye, nearly to the pupil, with two 5-pointed teeth, the points nearly equal in length; premaxillary teeth with five long points, the middle one much the largest. Origin of dorsal behind the ventrals, about equidistant between base of middle caudal rays and middle of eye. Anal short, its origin about equidistant from base of middle caudal rays and origin of pectorals. Ventrals reaching anal, pectorals not to ventrals. A rather broad, blackish band overlying a deeper black line; a jet-black band across end of tail, continued forward to a blunt median point and backward along the edge of each caudal lobe and along the middle caudal rays, but not to their tips.

Hemigrammus boulengeri Eigenmann, new species.

Tetragonopterus fasciatus interruptus EIGENMANN, part, Ann. N. Y., VII, 1894, p. 634 (Rio Grande do Sul). Not of Lütken.

Type.—No. 11073, Museum of Indiana University. Specimen 36 mm. to base of caudal, 45 over all. Rio Grande do Sul, Brazil, von Ihering.

Head 3.33; depth 2.66; A. about 22; lateral line about 30; eye

2.6 in head; maxillary 2.75; interorbital 2.75. Maxillary with one 3-pointed tooth; ventrals reaching past origin of anal, pectorals past base of ventrals; highest anal ray $1\frac{1}{4}$ in the base of anal. Humeral spot vertically elongate, distinct; a narrow, black lateral line lying deeper than the caudal spot and not connected with it; caudal spot well defined, not quite extending to end of middle rays; lower half of caudal with many pigment cells, blackish, upper half hyaline; basal two-thirds of anal dusky.

Named for Dr. G. A. Boulenger, of the British Museum of Natural History.

Hemigrammus anisitsi Eigenmann, new species.

Hemigrammus lütkeni EIGENMANN and KENNEDY, part, Proc. Acad. Nat. Sci. Phila., 1903, p. 519 (Estancia la Armonia). Not of Boulenger.

Type.—No. 10182, Museum of Indiana University, a specimen 37 mm. long, Villa Rica, J. D. Anisits.

Cotypes.—No. 10182*a*, three specimens as above.

Cotypes.—No. 9995, Museum of Indiana University. Ten specimens 22 mm. long, Estancia la Armonia, J. D. Anisits.

Head 3.5; depth 2.75; A. 24–26; lateral line 33–36; eye about 2.75 in head, greater than interorbital. Mouth comparatively large, maxillary not nearly reaching to end of first suborbital, about 3 in head, having a single, 3-pointed tooth. Highest anal ray 1.5 in the anal basis; ventrals to anal, pectorals to origin of ventrals; origin of dorsal equidistant from base of middle caudal rays and front of eye. Caudal spot forming a band on the end of the caudal peduncle, faintest above and below, rather *abruptly* continued posteriorly to the end of the middle caudal rays, *gradually* narrowed in front into a dark lateral line; caudal lobes hyaline; humeral spot vertically elongate; *distal* third of anal dusky, basal two-thirds of anterior rays free from pigment.

Named for Prof. J. D. Anisits, of Asuncion, Paraguay.

Hemigrammus santæ Eigenmann, new species.

Tetragonopterus ricularis interrupta LÜTKEN, Velhas-Flodens Fiske, XIII, 1875, p. 215 (Lagoa Santa).

Type.—Cat. No. 55652, U.S.N.M.

A comparison of specimens sent by Doctor Lütken to the National Museum, No. 41960, from Lagoa Santa shows that two of the specimens have a complete lateral line and two have it interrupted. They represent, respectively, Lütken's *fasciatus* and *interruptus*. There is no doubt but that these specimens are specifically and generically distinct. The latter is a *Hemigrammus* and differs, aside from the generic characters, in the proportions and color. In 1894 I recorded specimens of *H. interruptus* from Rio Grande do Sul, Brazil. A reexamination of these in connection with Lütken's specimens shows that they are not specifically identical with Lütken's specimens, and probably represent two distinct species, *boulengeri* and *lütkeni*. Lütken's speci-

mens which may be called *santæ* have the following characters: Depth 2.6; head 3.5; A. 21; eye 3.5, slightly longer than snout; interorbital 3 in head; maxillary slightly longer than interorbital; scales 6-30-3½. A second specimen: scales 5-33-3½.

Hemigrammus inconstans Eigenmann and Ogle, new species.

Type.—Cat. No. 34591, U.S.N.M., presented by J. C. Brevoort, Para (?), Brazil. One specimen, 44 mm. long to base of caudal (58 over all).

Type.—Cat. No. 55652, U.S.N.M.

Scales 6-32-4½; A. 26; lateral line on left *^a13 + 4 + 2 + 3 + 1 + 7 + 2*, on right *15 + 14 + 4*; one maxillary tooth.

Cotype.—One specimen 39 mm. to base of caudal (50 over all). Scales 6 + 32 + 5; A. 26; lateral line on left *10 + 1 + 2 + 16 + 3*, on right *17 + 2 + 1 + 9 + 3*.

Cotype.—One specimen 45 mm. to base of caudal (about 57 over all). Scales 6 + 32 + 5; A. 26; lateral line complete.

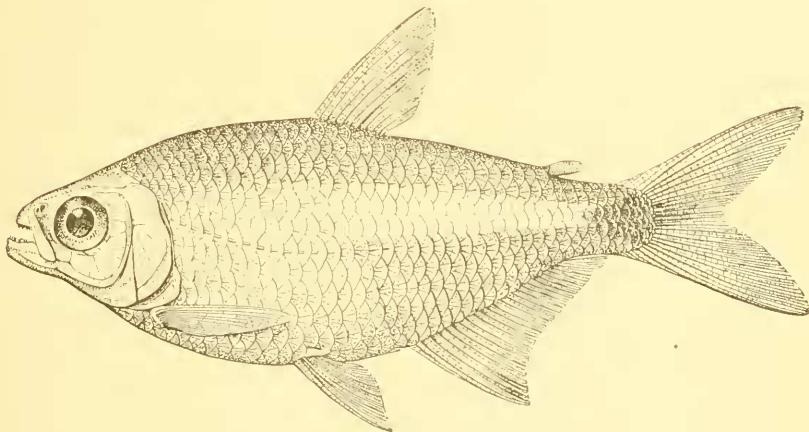


FIG. 4.—HEMIGRAMMUS INCONSTANS.

Cotype.—One specimen 38 mm. to base of caudal (about 51 over all). Scales 6 + 32 + 5; A. 26; lateral line complete.

Cotype.—One specimen 37 mm. to base of caudal (47 over all). Scales 6 + 33 + 5; A. 24; lateral line complete to the last two or three scales, which are without pores.

Depth 2.6-2.75; head about 4; eye equals interorbital, $2\frac{3}{4}$ -3 in head; snout 4 in head; maxillary not reaching to end of first suborbital, much shorter than eye, with a single tooth.

Origin of dorsal behind base of ventrals, pectorals reaching slightly beyond base of ventrals; ventrals nearly or quite to anal. Highly iridescent; an obscure vertical humeral spot, an indistinct lateral band; a conspicuous caudal spot which is not continued on the middle rays. Fins all dusky. This species is evidently very closely related, if not

^aThose in italics with pores.

identical, with Cope's *Astyanax phanicopterus*. There seems no doubt that the five specimens before us belong to the same species, although they do not have the same generic characters. Of the species of *Hemigrammus* it approaches *lütkeni* most closely.

Tetragonopterus argenteus Cuvier.

No. 39403. One specimen, Brazil, collected by H. H. Rusby.

No. 44831. One specimen, Bolivia, Gibbon collection.

No. 1631. Paraguay, Page collection.

Genus **ASTYANAX** Baird and Girard.

In the difficult and highly interesting group of Characins there is no more difficult nor more highly interesting genus than *Astyanax*. Its divergence toward *Hemigrammus*, which is like an *Astyanax* with an incomplete lateral line, toward *Hemibrycon*, which is like an *Astyanax* with a completely denticulated maxillary, toward *Moenkhausia*, which is like an *Astyanax* with a scaled caudal; and especially toward *Petersius* (which appears to be its African counterpart), together with its universal distribution in tropical and subtropical America, all indicate its central position in the system of Characins. Some of its species are well marked, but for the most part there are groups of species within which the specific characters are not well fixed. The most notable of these groups is that centering in *Astyanax rutilus*. This is a widely variable, universally distributed species, with which throughout its distribution there are allied closely related species. In the south are *theringii*, *fasciatus*, *cuvieri*, and perhaps others. In the north, notably in Central America, Mexico, and Peru, there is an especially trying series of species, varieties, or local forms. It will require much larger series representing a much wider array of localities than are at my command to finally describe the status of these forms. Those of the northernmost localities, north of central Mexico, represented by specimens with a small number of anal rays—from 20 to 25—may readily be set aside as *mexicanus*. From southern Mexico there have been recorded *fasciatus* (= *rutilus*) and *æneus* (Oaxaca). Through the courtesy of Prof. S. E. Meek, I have been able to examine many specimens from Perez, all of which appear to be *æneus*, and others from Montzorongó, some of which are *æneus*, and others with a larger eye and maxillary extending considerably beyond origin of eye may (?) represent *rutilus*.

From the Pacific slope of Guatemala have been recorded *rutilus*, *microphthalmus*, and *humilis*. I am not acquainted with either of the two latter. From the Atlantic slope probably come *rutilus*, *æneus*, and *brerimanus*; the last, a species with few anal rays, is probably a *mexicanus*. From Nicaragua have been recorded *arstedii*, which is not distinguishable from *æneus* or *rutilus*, and *nicaraguensis*, which is distinguished by the increased number of maxillary teeth.

Astyanax cuvieri Lütken.

No. 44961. Rio das Velhas (?), Brazil, Lütken. Two specimens agree with Lütken's (Velhas Flodens Fiske) fig. 13. They are marked *cuvieri*. They differ conspicuously from specimens of *rutilus* from Para and Rio Grande do Sul. In the largest specimen (49 mm. to base of caudal) we have depth 3.33; head 3.66; A. 29; scales 7-37-5; eye 2.5; maxillary long, equal to length of eye; snout 4; interorbital 3.66. Lütken's figure 14 represents a form intermediate between the typical *rutilus* and the specimens at hand.

Astyanax iheringii Boulenger.

No. 39132. La Paz, Montevideo, Uruguay, collected by W. E. Safford.

No. 39147. One specimen, Montevideo, Uruguay, collected by Archavaleta.

Astyanax fasciatus Cuvier.

No. 4889. Museum of Indiana University, Rio Grande do Sul, Brazil. *a* 102 mm. to base of caudal. Depth 2 $\frac{2}{3}$; A. 21; eye 3.6, equal to snout; maxillary longer than eye, 3+ in head; bony interorbital, 2.66 in head; an oval humeral spot.

b 76 mm. to base of caudal. Depth 2.6; A. 24; eye 2.8; snout 4; maxillary about length of eye; bony interorbital 2.8 in head.

c 73 mm. to base of caudal. Depth 2.66; A. 25; eye 2.8; snout 3 $\frac{1}{2}$; maxillary not quite as long as eye; bony interorbital 2.8.

On account of the small eye and wide interorbital the first of these specimens can readily be distinguished from specimens of *A. rutilus*, but otherwise, as stated under *A. rutilus*, there is such an intergrading between the two species that we are very doubtful whether they are distinct.

No. 44960 (part). Lagoa Santa, Brazil. Presented by Dr. Chr. Lütken.

These specimens represent Lütken's *A. rivularis*. They agree very closely with the specimens of *A. fasciatus* from Rio Grande do Sul.

a 70 mm. to base of caudal. Depth 3.25; head 4; A. 21; eye 3.75, equal to snout; interorbital 3 in head; maxillary equal to interorbital. Scales 6-33-3 $\frac{1}{2}$. A second specimen has anal 23; scales 6-36-3.

Astyanax rutilus (Jenyns).

I am not at all sure that *rutilus* and *fasciatus* are distinct species. I have numerous specimens from a variety of localities. In the more southern ones and those along the southeast coast of Brazil there are a few in which the number of anal rays is slightly less than in those from the Paraguay River. In depth there is a wide difference, ranging from the variety *jequitinhonhae*, whose depth is 3 in the length, to specimens from Tieté, in which it is 2.25. In a small specimen, 1 $\frac{1}{2}$ inches, from Piracicaba, the depth is even 4 in the length. The shoul-

der spot differs very widely in distinctness. A similar condition exists at the northern end of the range of this widely distributed species. Specimens from Nicaragua (*arstedii*) are not distinguishable. A better marked variety is the many-toothed *nicaraguensis*. Still further north comes *veneus*, and finally *mericanus*. It will take a large series of specimens to demonstrate the validity of these varieties.

I add details of a number of specimens in the museum of Indiana University and the National Museum.

Specimens collected by John W. Titcomb for the U. S. Fish Commission at Cordova, Argentine, are like those collected by Page in Asuncion, Paraguay.

a 88 mm. to base of caudal. Depth $2\frac{5}{7}$; A. 27; eye 3 in head; maxillary very slightly longer than eye; bony interorbital 8 in head; shoulder spot not evident.

b 94 mm. to base of caudal. Depth 2.8; A. 30; eye 3.2 in head; maxillary equal to eye; bony interorbital 2.9 in head: shoulder spot faint.

c 101 mm. to base of caudal. Depth 2.75; A. 28; eye 3 in head; maxillary equal to eye; bony interorbital 3.2 in head: shoulder spot faint.

No. 9267. Museum of Indiana University. Rio Tieté, Brazil, Von Ihering collection.

a 90 mm. to base of caudal. Depth $2\frac{3}{4}$; A. 27; eye 3; maxillary slightly shorter than eye; snout 3.7; interorbital equal to eye; scales 6-36-6. A very faint humeral spot.

b and *c* are much deeper.

b 97 mm. to base of caudal. Depth 2.25; A. 26; eye 3.1; maxillary equal to eye; snout 4 in head; interorbital 2.8; humeral spot scarcely evident; scales 6-34-5.

c 99 mm. to base of caudal. Depth 2.25; A. 24; eye 3.3; maxillary equal to eye; snout 4 in head; interorbital 2.8; humeral spot scarcely evident; scales 6-34-6.

These specimens are all much deeper than the usual *rutilus*.

No. 10788. Museum of Indiana University. Rio Tieté, Brazil, Von Ihering collection.

a 63 mm. to base of caudal, 78 mm. to tips of caudal. Depth 2.5; A. 23; eye 3; maxillary slightly shorter than eye; snout 4; interorbital equal to eye; scales 5-35-5. A vertical humeral spot; caudal band almost obsolete.

b 48 mm. to base of caudal. Depth 2.66; A. 25; scales 5-35-5.

These specimens are much slenderer than the older ones from the same place. Caudal band reduced to the minimum; shoulder spot well developed.

No. 10786. Museum of Indiana University. Rio Grande, a tributary of the Parana.

117 mm. to base of caudal. Depth 2.66; A. 28; eye 3.1; maxillary equal to snout; snout 3.6; interorbital 2.9; humeral spot faint; scales 6-39-5½.

No. 10787. Museum of Indiana University. Rio Camaguam, Rio Grande do Sul, Brazil.

73 mm. to base of caudal. Depth 2½; A. 30; eye 2.75; maxillary equals four-fifths diameter of eye; interorbital 3 in head; snout 4; humeral spot faint; scales 7-39-6 (4 above ventrals).

No. 9294. Museum of Indiana University. Rio Grande do Sul, Brazil.

This was considered by Eigenmann and Norris to be *scabripinnis*, but may be *fasciatus* or *rutilus*.

Depth 2.6; A. 25; eye 2.5; maxillary three-fourths as long as eye; snout 4; interorbital 3+ in head. Humeral spot faint; scales 7-34-5½.

No. 9285. Museum of Indiana University. Piracicaba. This was considered by Eigenmann and Norris to be *jequitinhonha*.

a 92 mm. to base of caudal. Very similar to 10787. Depth 2½; A. 30; eye 3, very slightly longer than the maxillary; snout 4.2; interorbital 3.2; humeral spot not evident; scales 6-35-6.

b 95 mm. to base of caudal. Depth 3; A. 29; eye 3, equal to the maxillary; snout 4; interorbital 3.25; no evident humeral spot.

c 41 mm. to base of caudal=new species?. Depth 4; A. 24 at least; eye 3, equal to maxillary in length; snout 3.75; interorbital 3; very faint humeral spot; scales 5-39-4.

No. 9268. Museum of Indiana University. Taubaté.

82 mm. to base of caudal. Depth 2.5; A. 29; eye 3.2, equals length of maxillary; snout 4 in head; bony interorbital 2.6; humeral spot faint; scales 8-39-6.

Anal rays and scales in other specimens in the museum of Indiana University from Paraguay are as follows:

From Asuncion, A. 25-30; scales 5-37 to 38-4.

From Villa Rica, A. 24-27; scales 34 to 35.

From Arroyo Chagalalina, A. 25; scales 36.

From Bahía Negra, A. 26 to 27; scales 35 to 36.

No. 1624. Three specimens, Paraguay, Page collection.

a 93 mm. to base of caudal. Depth 3; A. 30; eye 3 in head, snout 3.66; maxillary equals length of eye; bony interorbital 3+ in head.

b 101 mm. to base of caudal. Depth 3; A. 30 (3+27); eye 3 in head, snout 4; maxillary equals length of eye; bony interorbital, 3½ in head.

c 103 mm. to base of caudal. Depth 3; A. 31; eye 3 in head, snout 3.8; maxillary equals length of eye; bony interorbital, 3+ in head.

No. 3064. One specimen, Paraguay, Page collection. 95 mm. to base of caudal. Depth 2½; A. 30; eye 3 in head, snout 4; maxillary equals length of eye; bony interorbital 3 in head.

No. 34590. Locality probably Para, Brazil, presented by J. C. Brevoort.

a 52 mm. to base of caudal. Depth 2.66; A. 28; eye 2.75, maxillary nearly equals eye; interorbital 3; a faint humeral spot; scales 6-38-7 (5 above ventral).

b 70 mm. to base of caudal. Depth 2 $\frac{1}{2}$; A. 30; scales 6-37-6.

c 57 mm. to base of caudal. Depth 2 $\frac{1}{2}$; A. 29; scales 6-39-6.

No. 34589 (part). Para, Brazil, presented by J. C. Brevoort. Three specimens, A. 28, 29, and 29.

No. 8225. Napo or Marañon, Brazil, Orton collection. This specimen is 108 mm. long and is probably the *Astyanax carolinæ* of Gill. The only serious discrepancy seems to be in the length of the maxillary, which Gill says extends to the end of the first suborbital below the vertical from the anterior margin of the pupil.

Length to base of caudal, 85 mm.; depth 32 mm.; head from tip of snout to end of opercle 22 mm.; eye 6 $\frac{1}{3}$; interorbital 8; A. 26; scales 6-36-5; maxillary reaching beyond origin of eye, not to end of first suborbital; no teeth on maxillary. Caudal spot continued to end of middle rays; humeral spot faint.

No. 1659 (part). Eight specimens, 112-141 mm. long, Truando, Colombia, Michler and Schott collection.

These specimens are in all essential characters *A. rutilus*.

They average larger than specimens from other localities.

a A. 27, D. 10; scales 6-38-5 $\frac{1}{2}$.

b A. 27, D. 11; scales 6-38-6.

c A. 28, D. 11; scales 6-38-5 $\frac{1}{2}$.

d A. 26, D. 11; scales 6-38-5.

e A. 31, D. 12; scales 6-38-5.

f A. 27, D. 11; scales 6-37-5 $\frac{1}{2}$.

g A. 28, D. 10; scales 6-38-5.

h A. 29, D. 11; scales 6-37-5.

The depth ranges from 2 $\frac{2}{3}$ -2 $\frac{3}{8}$; head 4-4 $\frac{1}{2}$; eye 3; maxillary about equal to the eye; interorbital 2 $\frac{1}{2}$ -3.

No. 32515. Two specimens, Truando (?), Colombia, A. Schott. A. 29-30; scales 6-37-7; 7-37-6. Average number of anal rays of all the Truando specimens 28.3.

No. 19904. Two specimens, 115 and 120 mm. to base of caudal. West coast of Central America. A. 29; scales 7-37-6 to ventrals.

No. 19906. Twenty-three specimens. Central America. A. 28-32.

No. 19913. Central America.

Astyanax rutilus *ørstedii* Lütken.

Two series of specimens from Nicaragua represent Lütken's species. They are intermediate between typical *rutilus* and *æneus*, and could without violence be placed either with *rutilus* or with *æneus*.

They are as follows:

No. 37828. Nicaragua, Central America, Bransford collection.

Beginning with the largest of the 11 specimens under this number, we have the following:

a A. 29; scales 7-38-6; a humeral spot, a band-like caudal spot; depth $2\frac{3}{4}$.

b A. 31; scales 8-37-7; a humeral spot, a band-like caudal spot; depth $2\frac{3}{8}$.

c A. 32; scales 7-?-4; a humeral spot, a band-like caudal spot; depth $2\frac{3}{8}$.

d A. 30; scales 7-38-7; a humeral spot, a band-like caudal spot; depth $2\frac{3}{8}$.

The anal rays in detail are one with 27, five with 29, two with 30, one with 31, two with 32; average 29.7. Maxillary usually with 2 teeth, sometimes but one.

No. 39918. Nicaragua, presented by L. F. H. Birt? Eight specimens.

A humeral and a caudal spot, the latter distinct and band-like; scales lost at origin of lateral line, and the count, therefore, uncertain.

A. 30; scales 7-34-6; depth $2\frac{3}{4}$.

A. 28; scales 7-35-6; depth $2\frac{3}{8}$.

A. 28; scales 7-37-6; depth 3.

The anal rays are, one with 27, three with 29, two with 30, two with 31; average, 29.5. Maxillary always with 2 teeth.

Astyanax rutilus nicaraguensis Eigenmann and Ogle, new subspecies.

Type.—Cat. No. 55653, U.S.N.M. From Nicaragua, Bransford collection.

Cotypes.—Several specimens from the same source.

Maxillary slender, having 2-7 teeth, in the latter case the teeth extending along more than half the length of the bone. Of 35 specimens, there are 9 with 2 teeth, 2 with 3 teeth, 5 with 4 teeth, 5 with 5 teeth, 5 with 6 teeth, 5 with 7 teeth, 3 with 8 teeth, and one with 9 teeth on the maxillary.

Three have 27 anal rays, twelve have 28, eight have 29, ten have 30, three have 32; average 29.

It is possible that the specimens with numerous maxillary teeth are all males.

In general characters the specimens agree with the specimens identified as *arstedii*, and those with but two maxillary teeth are indistinguishable from them. The fact that such a large per cent. of specimens have a large number of maxillary teeth entitles them to a separate name.

Astyanax rutilus, variety?

No. 43597. Two specimens. Mexico, presented by A. Dugès.

A. 28; scales 8-37-5; depth 3.

A. 29; scales 7-37-5; depth 3.

In one the interorbital is distinctly less than the diameter of the eye, in the other just equal to it; the maxillary about equal to the eye, which is $2\frac{3}{4}$ in the head. The pectorals extend a little beyond the origin of the ventrals.

These specimens and the next one have much larger eyes than specimens of *æneus* from Mexico. I am not able to say definitely what the name of the variety should be. Specimens collected by Meek at Montzorongo and labeled *æneus* belong in part to *æneus* and in part to this large-eyed variety.

No. 44946. One specimen. Veracruz, Mexico, collected by A. L. Herrera. A caudal band and a humeral spot?

A. 31; scales 8-38-7; depth $2\frac{3}{4}$; eye $2\frac{3}{4}$; maxillary not equal to the eye; interorbital not quite equal to eye; eye $2\frac{3}{4}$ in head.

Astyanax rutilus æneus Günther.

We have been able to examine a very large series of specimens of this species collected by Prof. S. E. Meek in Mexico and by Newton Miller in Guatemala.

No. 10928. Museum of Indiana University. Montzorongo, Mexico; Meek collection.

No. 10929. Museum of Indiana University. Perez, Mexico; Meek collection.

No. 11129. Museum of Indiana University. Sulphur River, $3\frac{1}{2}$ miles west of Puerto Barrios, Guatemala, collected by Newton Miller.

No. 11130. Museum of Indiana University. Rio Motagua at El Rancho, Guatemala.

No. 11131. Museum of Indiana University. Rio Tenedores at Tenedores, Guatemala.

No. 11132 and 11135. Museum of Indiana University. Rio Kilagua at Los Amates, Guatemala.

No. 11133. Museum of Indiana University. Rio Gualan at Gualan, Guatemala.

No. 11134. Museum of Indiana University. Rio Motagua at Gualan, Guatemala.

No. 11136. Museum of Indiana University. Rio Managua at Algeria, Guatemala.

No. 11137. Museum of Indiana University. Brook east of Los Amates, Guatemala.

No. 11138. Museum of Indiana University. Swamp one-half mile east of Los Amates, Guatemala.

Specimens from Guatemala are broader headed than those from Mexico.

I doubt very much whether specimens of *fasciatus* and *mexicanus*, *rutilus*, *arstedii*, and *æneus*, if freshly collected, similarly preserved, and mixed in one heap, could be separated specifically.

Of twenty specimens from No. 11134 selected at random two have 25 anal rays, two have 26, five have 27, six have 28, one has 29, two have 30, and two have 31; average 27.8.

Of twenty specimens from No. 10929 one has 23 rays, three have 25, seven have 26, seven have 27, two have 28; average 26.25.

Of ten specimens from No. 11136 one has 25 anal rays, four have 27, two have 28, three have 29; average 27.8.

It is seen from the above that the Mexican specimens are more nearly like *mexicanus* than the Guatemalan specimens, having 26.25 rays, as compared with 27.8.

Astyanax mexicanus (Filippe).

No. 836. Nineteen specimens, collected by C. B. Kennerly.

No. 869. One specimen, Rio Nueces, Texas, collected by J. D. Graham.

No. 869. Two specimens, Devils River, Texas, collected by J. D. Graham. Type.

No. 870. Eight specimens, Rio Leone, Texas, collected by J. D. Graham. A. 20-24.

No. 871. Three specimens, collected by J. D. Graham.

No. 875. Fourteen specimens, Comanche Springs, Texas, collected by J. D. Graham.

No. 875. Eight specimens, Elm Creek, Texas, collected by J. D. Graham.

No. 876. Twenty-four specimens, Devils River, Texas, collected by J. D. Graham.

No. 877. Twenty-nine specimens, Brownsville, Texas, collected by Captain Van Vliet.

No. 881. Three specimens, Rio Seco, Texas, collected by C. B. Kennerly.

No. 882. Eight specimens, Comanche Spring, Texas, collected by Heermann.

No. 884. Eleven specimens, Caderita, Texas, collected by D. N. Couch. Type. A. 21-24.

No. 885. Five specimens, China, near Leon, Texas, collected by D. N. Couch. Type.

No. 886. Eight specimens, Caderita, near Leon, Texas, collected by D. N. Couch.

No. 8796. Twenty-one specimens. (?) (?)

No. 8969. Twenty-two specimens, Stockton, Texas, collected by P. Duffy.

No. 20095. One specimen, Rio Grande, Texas, collected by J. H. Clarke. Type.

No. 20264. Thirty-four specimens, Matamoras, Texas, collected by L. B. Couch.

No. 34597. Two specimens, Mexico, collected by A. Dugès. A. 27-28.

No. 44641. Five specimens, Las Moras Creek, Texas, collected by E. A. Mearns.

No. 49076. Thirty-five specimens, Fort Clark, Texas, collected by E. A. Mearns.

No. (?). Four specimens, (?) collected by C. B. Kennerly. Type.

No. (?). Six specimens, near Monterey (?), collected by D. N. Couch.

The anal rays in specimens at random from different localities were as follows:

Two have 20 rays; two have 21; ten have 22; seventeen have 23; seventeen have 24; two have 25; average 23.

Astyanax fischeri Steindachner.

Through the courtesy of Prof. C. H. Gilbert I have been able to examine a large number of specimens from the Pacific slope of Panama. These specimens present the following characteristics:

A vertical humeral spot bordered in front and behind by a light area; a second vertical spot behind the light area; a lateral band silvery or plumbeous ending in a caudal spot on the last (5) rows of scales, not continued on the middle caudal rays; caudal and anal narrowly margined with dusky; all markings more or less distinct.

Maxillary with 1 to 3 teeth; eye 3-3.2 in head, 1-1.25 in the inter-orbital, distinctly longer than snout; maxillary equals length of snout. Dorsal behind the ventrals. Head, 4; depth, 2.4-2.7; scales, 6½-7½; 34 to 37-5½ to 6½; A. 23 to 26.

The scales and anal in a number of specimens are as follows:

Scales 7-37-6; A. 26. Scales 7-36-6; A. 28.

Scales 7-35-6; A. 25; female. Scales 7-37-5; A. 27.

Scales 7-37-6; A. 25.

Scales 7-35-5; A. 27; male. Scales 6-35-5; A. 23.

Scales 7-35-6; A. 25.

Scales 7-35-5; A. 25. Scales 7-36-6; A. 25.

In one small specimen the scales are 7-35-7; A. 27.

One specimen, Panama, presented by Capt. J. M. Dow.

No. 16678. Rio Frijole, Panama, Bransford collection. A. 24-29, usually 25-27.

Nos. 16680, 16681. Empire Station, Panama, Bransford collection. A. 24-27; scales 6 or 7-34 to 37-5.

Astyanax emperador, new species.

Type.—Cat. No. 55651, U.S.N.M. A specimen 52 mm. to base of caudal; Empire Station, Panama.

Cotypes.—No. 55651*a*, U.S.N.M. Two specimens 37-35 mm. long to base of caudal. Empire Station, Panama, Bransford collection.

Scales 8-45-7; 8-40-6; 8-39-7; A. 29, 28, 29; head 3.6 or 3.5; depth 2.7-3; eye large, 2.8-2.6 in head; interorbital 3.25 in head; maxillary long, equal to eye, having two narrow teeth.

Elongate, body deepest a little behind origin of pectorals; dorsal placed behind the origin of ventrals, its origin equidistant from front of eye and base of middle caudal rays. Highest dorsal ray equal to head without opercle; pectorals reaching ventrals, ventrals to anal.

A faint humeral spot; caudal spot distinct, not reaching end of middle caudal rays. A silvery lateral band.

This species is closely related to *fischeri*, with which the specimens were confounded. They differ in the smaller scales.

Astyanax bimaculatus (Linnaeus).

No. 34437. Five specimens, Para, Brazil, presented by J. C. Brevoort.

No. 34453. One specimen, Para, Brazil, presented by J. C. Brevoort.

No. 34591. Five specimens (?), Brazil, presented by J. C. Brevoort.

No. 36764. Five specimens, British Guiana, British Museum.

No. 44957. Four specimens, Lagoa Santo, Brazil, presented by Chr. Lütken.

Astyanax bimaculatus lineatus (Perugia).

Nos. 1621, 1695, and 3065, and one without number; five specimens. Paraguay, collected by Page.

Astyanax orthodus Eigenmann, new species.

Type.—Cat. No. 55655, U.S.N.M. Specimen 92 mm. long to origin of caudal, Truando, Colombia, Michler and Schott, collectors.

This species is identical with *Astyanax bimaculatus* in apparently all characters except the teeth. In *bimaculatus* the teeth of the inner series of the premaxillary are convex behind; the denticles correspond to this convexity and are therefore arranged in a curve. This curve varies from a crescent to U-shape in a specimen from Piracicaba. In *orthodus* the anterior and posterior surfaces of the teeth are alike, the denticles being arranged in nearly a straight line. These species differ, therefore, as *Micrallestes* differs from *Myletes*.

Head 4; depth $2\frac{2}{5}$; D. 11; A. 33; scales 6-40-6 above ventrals, 8 above origin of anal. Dorsal and ventral profiles equally curved, the ventral curve continuous, the dorsal profile very slightly concave over the eyes; eye a little more than 3 in the head; interorbital $2\frac{1}{2}$; maxillary distinctly longer than in a specimen of *bimaculatus* of the same size, longer than eye, a little less than 3 in the head; maxillary with a single tooth.

In the position of the dorsal, equidistant from tip of snout and base of upper caudal rays, and the position of the ventrals the specimen agrees exactly with one of *bimaculatus* of equal size from Rio Grande

do Sul. Pectorals reaching to ventrals; ventrals to near anal; anal basis convex; adipose well developed.

A longitudinal oval humeral spot, *not* surrounded by a light area; caudal spot continued to end of middle rays.

Astyanax abramis (Jenyns).

Nos. 1621 and 1622. Two specimens, Paraguay, collected by Page.

Astyanax stilbe (Cope).

No. 34589 (part). Several specimens, probably from Para, presented by J. C. Brevoort.

Astyanax atratoensis Eigenmann, new species.

Type.—Cat. No. 1659, U.S.N.M. Specimen 105 mm. long over all, Truando, Colombia, Michler and Schott, collectors.

Cotypes.—Four specimens, respectively 100, 75, 68, and 68 mm. to base of caudal. The longest specimen was probably over 120 mm. in

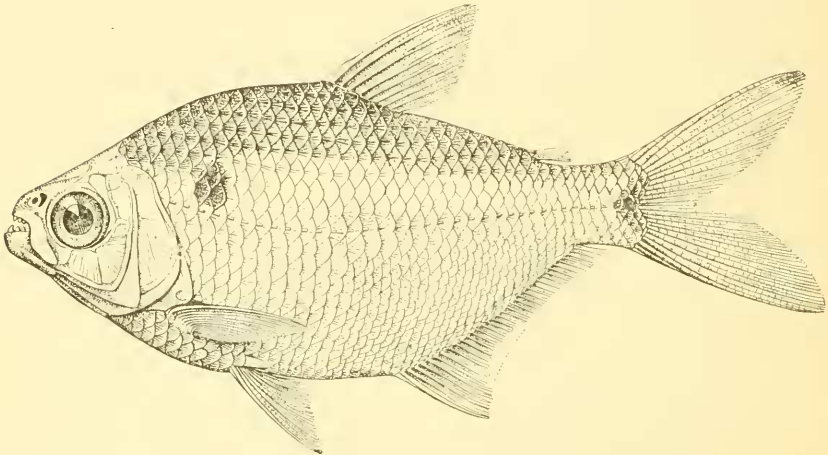


FIG. 5.—ASTYANAX ATRATOENSIS.

total length. All from Truando, Colombia. Very closely related to its neighbor in the Cauca, *Astyanax caucanus* Steindachner.

It differs from it in the general shape, scales, and the presence of a maxillary tooth. D. I, 10 or 11; A. 38 or 39; scales 8 or 9–36 to 40–10 or 11 to anal, 8 or 9 to the ventrals; depth 2–2.2; head 3.66–4; eye 2.8–3 in head, snout 4; interorbital 2.66.

Much compressed, the postventral surface trenchant; subrhomboidal, the dorsal profile being equally arched with the ventral, the anal basis being nearly parallel with the predorsal profile; profile slightly concave over the eye, nape not sharply convex as in *Tetragonopterus*.

Interorbital distinctly convex, the fontanel extending to over the anterior border of the eye; cheeks entirely covered; mouth moderate, the slender maxillary not extending much, if any, beyond origin of eye; premaxillary with four teeth in the outer row and five in the

inner; inner surface of the inner teeth convex, the points being arranged in a curved line, the middle point distinctly largest; maxillary with one small tooth; cheeks entirely mailed.

Dorsal over the eleventh scale of the lateral line, origin of ventrals under the ninth; dorsal pointed, the anterior rays longest; caudal deeply forked, anal basis long, its origin nearer base of pectorals than to the end of the anal; ventrals nearly reaching anal, pectorals beyond origin of ventrals. Scales regular, cycloid, decreasing regularly in size from the back to the origin of the anal.

Iridescent; a well marked *vertically* oval humeral spot; a silvery lateral band, a small caudal spot, not continued on the middle rays.

Astyanax multiradiatus Eigenmann and Kennedy.

No. 1622 (part). One specimen, Paragnay, Page collection.

Astyanax megalops Eigenmann, new species.

Type.—Cat. No. 5192, Museum of Indiana University. Specimen 42 mm. to base of caudal, Itaituba, Brazil.

Scales 5-35-4; A. 28; depth 2.66; head 3.6; eye 5 in snout, 2.3 in head; interorbital 3 in head; maxillary long, nearly as long as eye, with 3 small teeth. Deepest at origin of dorsal, compressed. Dorsal high, its longest ray longer than head, its origin over base of ventral, much nearer tip of snout than base of caudal; pectorals extending a little beyond base of ventrals; ventrals not to anal. Colors apparently much faded; a conspicuous, well-defined silvery lateral band; traces of a vertical humeral spot; no caudal spot. Related to *A. bahiensis*.

Nannæthiops unitæniatus (Günther).

No. 12679. One specimen, Gaboon River, Africa, presented by the British Museum.

Myletes dentex Linnæus.

No. 52092. One specimen, Atbara River, Egypt, Senff-Expedition collection.

No. 52091. Two specimens, Atbara River, Egypt, Senff-Expedition collection.

Myletes baremose Joannis.

No. 52084. Two specimens, Atbara River, Egypt, Senff-Expedition collection.

Brycinus macrolepidotus Cuvier and Valenciennes.

No. 52085. One specimen, Nile River, Atbara Junction, Egypt, Senff-Expedition collection.

No. 52093. One specimen, Atbara River, Egypt, Senff-Expedition collection.

Brycinus nurse Rüppell.

No. 52089. One specimen, Atbara River, Egypt, Senff-Expedition collection.

No. 52088. One specimen, Atbara River, Egypt, Senff-Expedition collection.

No. 52090. One specimen, Atbara River, Egypt, Senff-Expedition collection.

No. 52086. Two specimens, Atbara River, Egypt, Senff-Expedition collection.

No. 52087. Two specimens, Atbara River, Egypt, Senff-Expedition collection.

Bryconæthiops microstoma Günther.

No. 44814. One specimen, Congo, Africa, collected by J. H. Camp.

PHENACOGRAMMUS^a Eigenmann, new genus.

This genus differs from *Micralestes* as *Hemigrammus* differs from *Astyanax*, and as *Cheirodon* differs from *Odontostilbe*, etc. It is *Micralestes* with an incomplete lateral line.

Type.—*Micralestes interruptus* Boulenger.

Brycon reinhardti Lütken.

No. 44955. One specimen, Rio das Velhas, Brazil, presented by Dr. Chr. Lütken.

Brycon dentex Günther.

No. 39909. One specimen, Nicaragua, collected by L. F. H. Birt.

No. 22154. One specimen, Nicaragua, Bransford collection.

No. 16884. Two specimens, Lake Nicaragua.

Brycon striatulus Kner.

No. 5932. Two specimens in bad condition, Aspinwall, Panama, collected by Russell.

Brycon hilarii (Cuvier and Valenciennes).

No. 1613. One specimen, Paraguay, Page collection.

No. 1614. One specimen, Paraguay, Page collection.

Markiana nigripinnis (Perugia).

No. 1627. One specimen, Paraguay, Page collection.

Gasteropelecus sternicla Linnæus.

No. 34454. Para, Brazil, presented by J. C. Brevoort.

The premaxillary teeth in two of these specimens are strictly in a single series, very regularly arranged and graduated; no teeth in the maxillary. In two others the teeth are crowded, one on each side being forced forward to form an anterior series. There are apparently no maxillary teeth.

No. 1602. Guiana, collected by J. Wyman.

Premaxillary teeth in a single series; no maxillary teeth.

^a From φέναξ, deceptive; and γραμμῆ, line.

Genus THORACOCHAROX Fowler.

Type.—*Gasteropelecus stellatus* Kner.

In the Proceedings the Academy of National Sciences of Philadelphia (1906, p. 452) Fowler describes this as a new subgenus with the character "anterior profile of back convex." It deserves generic rank with the following characters:

Breast expanded into a large, sharp-edged disk.

Premaxillary teeth in two separate series, the outer series consisting of two teeth on each side; the pair of middle teeth enlarged, between the front and second series of teeth, projecting over the lower jaw when the mouth is closed; maxillary with several large, divergent canine-like teeth.

This genus is like a *Gasteropelecus*, with two series of premaxillary teeth and several canine-like teeth on the maxillary.

Chalcinus angulatus Agassiz.

No. 1616. Two specimens, Paraguay, Page collection.

No. 1696. Two specimens, Paraguay, Page collection.

No. 5558. One specimen, Bolivia, Gibbon collection.

Nos. 34545, 34455, and 34689. Three specimens, Para, Brazil, presented by J. C. Brevoort.

Piabucus melanostomus Holmberg.

No. 2104. One specimen, Paraguay, Page collection.

Piabucina panamensis Gill.

No. 16676 (type). One specimen, Atlantic side of Panama, Bransford collection.

No. 16677 (type). One specimen, Rio Frijoli, Panama, Bransford collection.

Ichthyoborus microlepis Günther.

No. 52083. One specimen, Atbara River, Egypt, Senff-Expedition collection, B. Dean, collector.

Hydrocyon forskalii Cuvier.

No. 52095. Two specimens, Atbara River, Egypt. Senff-Expedition collection.

No. 52094. One specimen, Nile-Atbara Junction, Egypt. Senff-Expedition collection.

Hydrolycus pectoralis Günther.

No. 39402. Brazil, collected by H. H. Rusby.

No. 5686. Bolivia, Gibbon collection.

Rhaphiodon vulpinus Spix.

No. 55667. One specimen, 760 mm., Paraguay, collected by E. Palmer.

Bramocharax bransfordii (Gill).

No. 16885. Three specimens, Lake Nicaragua, Bransford collection.

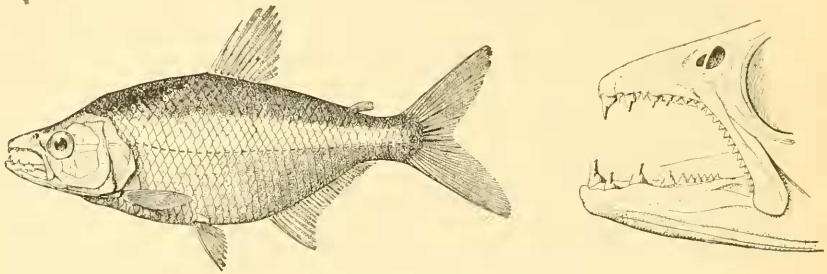


FIG. 6.—BRAMOCHARAX BRANSFORDII.

Rœboides guatemalensis Günther.

No. 39958. Two specimens, Rio San Juan, Nicaragua, collected by T. L. H. Birt.

Rœboides prognathus (Boulenger).

No. 1619 (part). Paraguay, Page collection.

No. 44835 (part). Marmora River, Bolivia, Gibbon collection.

Rœboides myersii Gill.

No. 21426. One specimen, Napo or Marañon River, Brazil, Orton collection (?). One of the types.

Rœboides xenodon Reinhardt.

No. 44962. One specimen, Rio das Velhas, Brazil.

Cynopotamus argenteus Valenciennes.

No. 1619 (part). One specimen, Paraguay, Page collection.

Charax sanguineus (Cope).

No. 8225. Four specimens, Napo and Marañon rivers, Brazil, Orton collection.

Charax gibbosus Linnæus.

No. 1603. One specimen, Guiana, collected by J. Wyman.

No. 1619 (part). Three specimens, Paraguay, Page collection.

Subgenus **CYRTOCHARAX** Fowler.

Type.—*Anacyrtus limæsquamis* Cope.

This is a subgenus of *Charax*, probably synonymous with *Cynopotamus*, and was described by Fowler^a as a new genus with the character "scales rough, very small or about 100 in lateral line. No palatine teeth." It may further be described as compressed, elongate, of moderate depth; dorsal near middle of body over the origin of the long anal; pectoral overlapping ventral; dorsal profile gibbous on occiput, concave in front; mouth large, oblique,

^aProc. Acad. Nat. Sci. Phila., 1906, p. 454.

the maxillary in the adult extending beyond the eye; maxillary with a series of nearly equal, conical teeth; premaxillary with a canine at each end and a double series of small teeth between, of which the inner series is composed of two teeth; mandible with a single series of teeth which are small, conical along the sides and larger on its anterior half, four of which are canines. One of these is near the front, but lateral to the anterior premaxillary canine; another, the smallest of the series, is directed outward more than the rest and nearly half way to the third, which is the largest, received in a groove of the upper jaw in front of the posterior premaxillary canine; the last is about as far back of the posterior premaxillary canine as the last mentioned is in advance of it.

This subgenus includes, besides the type, the *squamosus* Eigenmann and Kennedy, the *caliurus* and *atratoensis* of Eigenmann, and probably the *amazonus* of Günther.

Charax limæsquamis Cope.

No. 44835 (part). One specimen, Marmora River, Bolivia, Gibbons collection.

No. 1694. One specimen, Paraguay, Page collection.

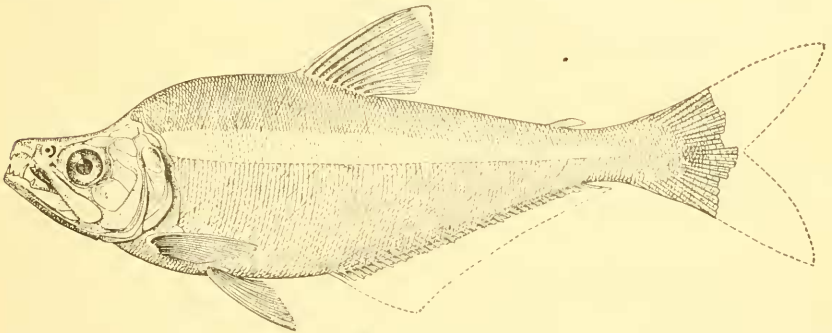


FIG. 7.—CHARAX SQUAMOSUS.

Charax squamosus Eigenmann and Kennedy.

No. 44837. One specimen, La Plata, Argentina, collected by S. S. Brooks.

Charax atratoensis Eigenmann, new species.

Type.—Cat. No. 1664, U.S.N.M. Specimen 300 mm. to end of lateral line, Truando, Colombia, Michler and Schott collection.

Cotype.—No. 1664, U.S.N.M. Specimen 217 mm. to end of lateral line, Truando, Colombia.

This species greatly resembles *Cynopotamus magdalena*, but has only a single series of teeth in the lower jaw and the cheeks are not so completely covered by the suborbitals. It is allied to *C. squamosus*,

with a shorter, blunter head, and to *C. limæsquamis*, from which it differs in little but the length of the anal.

D. 11; A. 47-50; head $3\frac{3}{5}$ - $3\frac{2}{7}$; depth a little more or less than 3. Scales 25-110 to 112-25; eye $4\frac{1}{2}$ to 6 in the head; snout $3\frac{1}{2}$ - $3\frac{3}{4}$; interorbital 4.

Profile very strongly concave, the occiput greatly arched; distance from tip of snout and tip of maxillary equal to distance from tip of snout through upper margin of eye to edge of preopercle; suborbitals extending back to vertical limb of preopercle, leaving only a small area behind the end of the maxillary exposed; teeth as in other members of the genus.

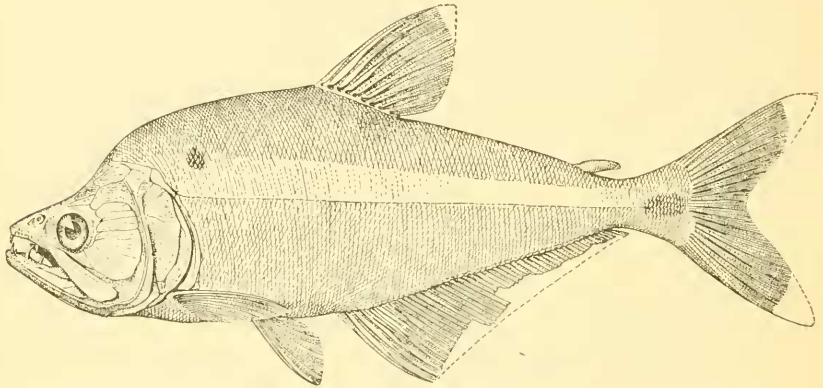


FIG. 8.—*CHARAX ATRATOENSIS*.

Pectorals extending past middle of ventrals to anal in smaller specimen, not quite so far in the larger. Entire surface of the scales very rough.

A silvery lateral band, a faint humeral spot in the smaller specimen, a large caudal spot, not continued to the end of the rays. Highly iridescent.

Salminus maxillosus Cuvier and Valenciennes.

Nos. 1630 and 1631. Three specimens, Paraguay, Page collection.
Acestrorhynchus falcatus (Bloch).

The species *A. falcatus* was based on a specimen from Surinam with anal rays 26; Müller and Troschel gave the lateral line as 80 and the anal as 30. Cuvier and Valenciennes had 3 (4) specimens, one from Surinam and two from Mana. One (not stated which) had lateral line 80, the others at least 100 "cent vingt" at one place, and "à cent" in another. I have a specimen from Surinam (Cat. No. 24670 U.S.N.M.) Bloch's type locality with lateral line 82-85 and A. 27, which is very probably the *falcatus* of Bloch. This specimen differs notably from other specimens in the Indiana University and National Museum collections, and from the *falcatus* of recent authors, and should be kept distinct from them. It is very probable that the smaller scaled

specimens in my possession, and referred to by recent authors under the name *filcatus*, should be referred to the *ferox* of Günther.

Acestrorhynchus falcirostris (Cuvier).

No. 12712. One specimen.

Acestrorhynchus ferox (Günther).

No. 1639. Two specimens, Paraguay; Page collection.

No. 1640. One specimen, Paraguay; Page collection.

No. 2102. One specimen, Bahia; Page collection.

No. 34464. Two specimens, Para (?), Brazil; presented by E. G. Blackford and J. C. Brevoort.

Nos. 33768 and 33769. Two specimens, Para (?), Brazil; presented by J. C. Brevoort.

Acestrorhynchus lacustris (Lütken).

No. 44963. One specimen, Lagoa Santa, Brazil; presented by Lütken.

? **Acestrorhamphus jenynsii (Günther).**

No. 39141. One specimen, La Paz, Montevideo, Uruguay; collected by W. E. Safford.

Serrasalmo marginatus Valenciennes.

No. 1611. Seven specimens, the largest 225 mm. long.

No. 2112 (part). Paraguay; Page collection.

Serrasalmo brandti Lütken.

No. 44964. One specimen, 217 mm. long, Lagoa Santa, Brazil; presented by Dr. Chr. Lütken.

Serrasalmo spilopleura Kner.

No. 2111. One specimen, Paraguay; Page collection.

Pygocentrus altus Gill.

No. 21432. One specimen, 155 mm. long. Napo or Marañon River, Brazil; Orton collection.

This is probably the type; the species is very close to *P. piraya* if not identical with it.

Pygocentrus nattereri Kner.

No. 1612. Four specimens, Paraguay; Page collection.

No. 5856. One specimen, Brazil; Gibbon collection.

? **Pygocentrus scapularis (Günther).**

No. 33227. One specimen, South America; presented by J. C. Brevoort.

Metynniss hypsauchen (Müller and Troschel).

No. 33772. Five specimens, South America; presented by J. C. Brevoort.

These specimens probably belong to this species. They have D. 16, 16, 17, 18, and 18; A. 39, 39, 40, 40, 43; abdominal serræ 34, 38, 39,

39, 40; depth about 1.25. Adipose at least equal to its distance from the dorsal, two-thirds or three-fourths as long as the dorsal.

? No. 3071. One specimen (in too poor condition for satisfactory examination), Trinidad, Bolivia.

***Myleus levis* Eigenmann and McAtee.**

No. 1613. One specimen, Paragua; Page collection. D. 29; A. 38; abdominal serræ 38+9.

***Mylossoma albiscopis* (Cope).**

No. 5888. Two specimens, Paraguay.

? ***Piaractus brachypomus* Cuvier.**

No. 26462. One specimen skin, about 550 mm. long, Paraguay; Page collection.

This specimen and one in the museum of Indiana University, 540 mm. long, lack an adipose. D. 16; A. 24; abdominal serræ 54+6; gill-rakers about half the length of the eye.

***Sarcodaces odoe* Bloch.**

No. 44824. Several specimens in bad condition, Leopoldville, Africa.

***Hoplias malabaricus* Bloch.**

No. 26695. Two specimens, Brazil; presented by the Museum of Comparative Zoology.

No. 34432. Two specimens, South America; presented by J. C. Brevoort.

No. 34696. One specimen; presented by J. C. Brevoort.

No. 6033. Two specimens, Island of Trinidad; collected by Th. Gill.

No. 1663. One specimen, Truando, Colombia; Michler and Schott collection.

No. 44959. One specimen, Lagoa Santa, Brazil; presented by Chr. Lütken.

***Hoplerythrinus* ^a*unitaeniatus* Spix.**

No. 33764. Three specimens, South America; presented by J. C. Brevoort.

No. 5882. One specimen, Island of Trinidad; collected by Th. Gill.

^aThe genus *Ophiocephalops* recently proposed by Fowler is a synonym of *Hoplerythrinus*.